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ON THE USE OF THE TERMS POIKILITIC AND MICROPOIKILITIC IN PETROGRAPHY.

It is evident that descriptive petrography needs some generally accepted term for both a macroscopic and microscopic rock structure which is, in a certain sense, intermediate between those known as the *granular* or *microgranitic* and *graphic* or *micropegmatitic*. Areas have been observed and variously described in many types of massive rocks, whose component minerals possess neither the complete independence of optical orientation characteristic of granular structures, nor the entire optical continuity of the separated portions of two interpenetrating crystal individuals. These areas are in fact occupied by a comparatively large individual of one mineral which is more or less completely filled with crystals or grains of other minerals, arranged with no reference to one another or to their host. This structure does not usually appear as distinct from the granular except when seen as a mottling of a large cleavage surface of the enclosing mineral in a hand specimen, or as an irregular spotting of a uniformly extinguishing area under the microscope. In ordinary light, such an area may appear quite granitic, but between crossed nicols it is very distinctive.

Like the graphic or micropegmatitic structure, this relation is most commonly observed between quartz and feldspar, especially in the groundmass of quartz-porphyries; but, like that structure, it is also by no means uncommon between many other species.

Essentially this structure was figured and described at length by the writer in a quartz-porphyry from near Tryberg, in the Black Forest, in 1883,¹ although no particular name was at that time given to it. In 1886 the writer proposed the term *poikilitic*

¹ Neues Jahrbuch für Min., etc., Beilage bd. II, p. 607. Plate XII, figs. 3 and 3^a, 1883.

(ποικίλος, mottled)¹ for the macroscopic equivalent of this structure which is characteristic of the hornblende of the Stony Point hornblende-picrite or cortlandtite, as it is also of the Baste and Schriesheim *schillerfels* of Germany. This had before been called "*luster mottling*," by Pumpelly² and Irving,³ but this name is not capable of application to other allied structures of different appearance. In 1887 the writer described this macro-poikilitic structure in the orthoclase phenocrysts of an orthoclase-norite, belonging to the Cortlandt series.⁴

Though it is not uncommon in many minerals, it is less important and less frequent than the micropoikilitic structure in the groundmass of acid porphyritic rocks of all ages. When studying the ancient quartz-porphyrries of Missouri for his thesis, Prof. E. Haworth encountered it and applied to it for the first time the name *poecilitic*.⁵ In this connection the writer furnished Dr. Haworth the following from his lecture notes:

"A holocrystalline groundmass contains no amorphous or unindividualized matter whatever, and independently of differences occasioned by variations in the fineness of grain, three quite distinct types of holocrystalline structure are distinguishable. These three types are conditioned by the mutual relation of the quartz and feldspar crystals, which compose the groundmass. In the first place they may be wholly independent, thus giving rise to a granular aggregate which is well designated by the term *Microgranitic Structure*.

"In the second place a granular effect may be produced by the complete interpenetration of two individual crystals of the same size. In this case—due to the simultaneous crystallization of the two minerals from the magma—all the parts of the same individual, no matter what the size or shape, must

¹American Journal of Science (3^d ser.), vol. 31, p. 30, Jan., 1886. This term was at first incorrectly spelled *poicilitic* and subsequently corrected by Prof. Dana to its Latin form, *poecilitic* (*ib.* vol. 33, p. 139, Feb., 1887). Its preferable orthography is, however, that given above. At the time it was proposed the writer was not familiar with Breithaupt's name, *poikilit*, for bornite, nor with the designations, *terrain poecilien*, *poecilitic* and *poikilitic*, given successively by Brongniart (1829), Conybeare (1832) and Buckland (1837) to the "New Red" sandstone (cf. Bridg. Treat. II., p. 38). The totally different application of these terms could, however, produce no confusion with the one now proposed, even if they were not obsolete.

²Proc. Am. Acad., vol. 13, p. 260. Boston, 1878.

³Monogr. U. S. Geol. Survey, vol. 5, p. 42, 1883.

⁴American Journal of Science, (3^d ser.) vol. 33, p. 139, 1887.

⁵Am. Geologist, vol. 1, pp. 368, 369; Pl. I, fig. 1, June, 1888.

have exactly the same optical orientation, and must hence extinguish the light between crossed nicols together. Such a structure is termed, according to the particular form it assumes, *micropegmatitic* or *granophyric*.

"In the third place a single large crystal of one of the two constituents of the groundmass may be filled with much smaller, irregularly arranged grains or crystals of the other. This would also give the general effect of a finely granular structure, although it is essentially different from either of the others above mentioned."¹

The same structure was briefly described by Teall in a quartz-felsite from the Cheviot Hills, but without any particular designation being applied to it.² Harker also mentions a variety of the same structure as common in the ancient rhyolitic lavas of Wales.³ Cross described the macro-poikilitic structure in a hornblende-peridotite, from Custer county, Colorado,⁴ and the micropoikilitic structure in a rhyolite from Silver Cliff in the same district, although the connection between the two was not mentioned. In speaking of the latter rock, he says of the groundmass:

"There seems to be no isotropic matter, but individual characteristics of form and optical action are lost through the minute size of the grains which overlap and overlie each other in the thinnest attainable sections. This mixture is irregular in many cases, but in others a mottled appearance is produced in that one substance attains a uniform optical orientation in certain areas, but is filled by inclusions of the other substance. No regular intergrowth of the two can be discovered. In some spots it was clearly quartz which was the enveloping mineral."⁵

Brögger has described the groundmass of a quartz-porphyry from the region of Christiana as having a typical poikilitic structure.⁶

In his recent monograph on the Eruptive Rocks of Electric Peak and Sepulchre Mountain in the Yellowstone Park, Iddings describes the micropoikilitic structure in the groundmass of certain dike porphyrites, where he for the first time makes use of exactly this term.⁷ In speaking of the Sepulchre Mountain dikes,

¹ Loc. cit. pp. 367, 368. ² British Petrography, p. 343. London, 1888.

³ The Bala Volcanic Series. Cambridge, 1889, pp. 22, 23.

⁴ Proc. Colorado Scientific Society, vol. 2, p. 242. 1888.

⁵ Ib., p. 232. ⁶ Zeitsch. für Kryst. u. Min., vol. 16., 1890., p. 46.

⁷ Twelfth Ann. Rept. U. S. Geol. Survey, p. 589. 1892.

he calls it a "patchy structure," but says it is identical with what he before called the micropoikilitic (micropoicilitic).¹

The micropoikilitic structure is extremely abundant in the ancient acid lavas of South Mountain,² in southern Pennsylvania and Maryland. It can there be proved in some cases to be of secondary origin as it occurs in plainly devitrified glasses, and it is the writer's opinion that such enclosing quartz areas will, in many cases, prove to have originated subsequent to the solidification of the rock.

I am not aware that either the macro- or micropoikilitic structures have been directly recognized by the German petrographers. I am indebted to Prof. L. V. Pirsson of New Haven for the information that the latter is recognized in France, although we have been unable to find any definition of it in print. He has shown me a section of a quartz-porphyry from Georgia, with a groundmass exactly like those from South Mountain, which Fouqué examined and pronounced an admirable example of the "*type épongeuse*," sometimes called "*structure pétrosiliceuse à ponce*." It is clearly not the same as Michel Lévy's *structure globulaire*, which he defines: "Sphérolites radiés, imprégnés de quartz orienté dans un sens optique unique. Globules imprégnés de quartz orienté, auréoles,"³ because there the included matter is radially arranged, while in the micropoikilitic structure it is wholly irregular in its arrangement.

The references given above are sufficient to demonstrate the frequency of the rock structure here mentioned, and to show the desirability of some term to describe it. It is therefore proposed that *poikilitic* and *micropoikilitic* be employed for rock structures, whether primary or secondary, conditioned by comparatively large individuals of one mineral enveloping smaller individuals of other minerals, which have no regular arrangement in respect either to one another or to their host.

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¹ *Ib.*, p. 646.

² American Journal of Science, (3^d ser.) vol. 44, p. 482, Dec., 1892.

³ Roches Éruptives, p. 29. Paris, 1889.